

# SELECTED ABSTRACTS OF PAPERS AT THE PAN-AMERICAN CONGRESS.

## NATIONAL METEOROLOGICAL INSTITUTE OF URUGUAY.

By HAMLET BAZZANO.

[Author's abstract.]

The author begins with a description of the work carried on in the meteorological section of the institute and of the instruments of the section employed in the study of atmospheric electricity, of clouds, of telluric currents and their physical laws, of temperature and gravity, as well as the careful study of winds, which is a meteorologic factor of the greatest importance for the study of the estuary of the Plata River.

Incidentally he refers to the propaganda carried on by the institute for the purpose of eliminating the general tendency to make use of averages exclusively, analyzing the remote influences and anomalies in the course of the curves of the registers.

Then he analyzes the great differences between the meteorologic conditions of different points in the country and describes the work of the institute in the determination of the meteorologic data referred to and of the salinity, temperature, and other characteristics of the waters of the Plata, a study which has served for determining the propagation in various conditions of the tidal wave from the Atlantic.

He refers to the work undertaken some years ago by the institute of fixing the relation between certain classes of crimes and the state of the atmosphere, noting as a result of this work a parallelism between the increase of temperature and humidity and of the delinquencies in Montevideo. The results of five or six more years of observations are being awaited before attempting to draw conclusions on this subject.

The work done by the central observatory of the institute in the making of a weather map is then briefly described. Argentina, Brazil, and Uruguay and other countries of the southern part of the continent contribute to this work.

The work done by the section of the official time is also described. This section has charge of the transmission of the time to mariners, to the city three times a day, and to different points of the city where there are electric clocks, and the setting and regulating of chronometers and of clocks, especially those used in navigation.

The paper concludes with a description of the work done by the semaphoric service recently annexed to the National Meteorological Institute.

## SNOW SURVEYING: ITS PROBLEMS AND THEIR SOLUTION.

By J. E. CHURCH, Jr.

[Author's abstract.]

The problem of precipitation and run-off has become the dominant meteorological problem in the semiarid States where irrigation is fundamental to agriculture.

Most of the requisite precipitation falls in the form of snow upon the higher mountains, where it is conserved until summer. The estimate of this precipitation and the amount of water available from it is complicated by the fact that for Nevada and probably other States reservoirs impound only 5 per cent of the water used in irrigation.

*Apparatus.*—Since the precipitation in this region is limited and must be used to the best advantage, the seasonal forecast should be based upon the most accurate methods compatible with the service rendered. Estimates of available water should preferably be based upon surveys of the snow fields themselves.

The seasonal snow gage is unsatisfactory, because of the strong wind currents, the great depth of snow, local divergencies in precipitation, probable freezing of the contents, and consequent difficulty in measuring the water content in March or April, when seasonal estimates should be made. A gage heated by acetylene gas would be expensive, and the cost of a number of seasonal gages of any type would be prohibitive.

Snow stakes in ordinary numbers are also unsatisfactory, except in forested regions or pockets of the mountains where the snow fields are protected from erosion and shifting by the wind. It is also questionable whether stakes of sufficient strength and height and in requisite numbers can be erected at reasonable expense.

Snow stakes, moreover, afford no clue to the exact water content of snow. However, the analysis of 1,900 measurements of the depth and water content of the snow on exposed mountain peaks has resulted in a table of relative density based on season and depth from which the water content of wind-driven snow can be approximately determined by an ordinary rod, if used along definite courses. It is hoped that the analysis of several thousand measurements already made at lower elevations in the forests will result in a similar table for snow laid under more tranquil conditions.

The snow sampler in its most highly developed form solves the difficulties confronting the seasonal gage and the snow stakes and can be operated anywhere that two men on snowshoes can go.

*Methods.*—The unit in snow surveying should be conducted to determine local divergencies in precipitation. This is especially neces-

sary where the seasonal estimate is based upon the snow cover of the total watershed rather than upon the percentage relationship of the snow cover in characteristic parts of the basin to the corresponding snow cover of some season or series of seasons whose run-off is known.

The courses should be long and exactly marked, and measurements should be made at definite intervals. Where possible, level ground should be selected in order to obtain a mean between the overloaded northern slopes and the thinly covered southern ones.

The method of percentage relationship is probably simplest, and estimates have been accurate within 12½ per cent.

By careful surveys in one basin it is possible to forecast for the next adjoining basin as well.

## TEMPERATURE CONDITIONS AT NEW ORLEANS AS INFLUENCED BY SUBSURFACE DRAINAGE.

By ISAAC M. CLINE.

[Author's abstract.]

The frequent occurrence of high temperatures at New Orleans in recent years, which general meteorological conditions did not account for, indicated that some local influences are responsible for their occurrence.

New Orleans is situated near the center of the great Mississippi Delta. The elevation of a large part of the city is not much above sea level, and the ground water under ordinary conditions was level with the surface of the ground. Storm water and water from other sources was carried away in a sluggish manner over the surface. Much of the country surrounding New Orleans was covered the greater part of the time with water from the Gulf of Mexico. These conditions exerted a material influence on temperature conditions, giving a climate insular in many respects.

Natural physical conditions as they existed were not conducive to healthfulness and the water formed breeding places for disease-carrying mosquitoes and other pests. To relieve this condition, subsurface drainage was put into operation in 1900, and a sewerage system to carry off sewage water was installed in 1903. The operation of these drainage systems has carried off the surface water rapidly and lowered the level of the ground water 6 to 8 feet below the surface of the ground. Large areas around New Orleans have been drained, so that ground which was formerly marsh or with the ground-water level with the surface of the land is now under ordinary conditions dry ground.

The effects of these artificial changes in physical condition on solar and terrestrial radiation have materially affected temperature conditions. Prior to 1900 the temperature at New Orleans had never reached 100°F., but since that year temperatures of 100°, or above, have been recorded seven times. During the 15 years prior to the installation of subsurface drainage in 1900, temperatures of 95°, or above, were recorded on 35 days, while during the 15 years 1900 to 1914, inclusive, the period during which subsurface drainage has been in operation, temperatures of 95°, or above, have been recorded on 74 days, an increase of 122 per cent over that of the period just prior to the installation of subsurface drainage. Other temperatures have also been materially influenced by the artificial changes in physical conditions.

The summer of 1915, which is not included in the two periods compared, had 25 days with the temperature 95°, or above, only 10 days less than the total number in the 15 years ending with 1899, just preceding the installation of subsurface drainage. The precipitation during the summer of 1915 was above the normal, but the number of rainy days was only about half the average. There were periods of 6 to 8 days in succession without rain, which gave the changes made in physical conditions an opportunity to show their influences. Similar periods without precipitation prior to subsurface drainage, even in months when the amounts were below the normal, did not give high temperatures comparable with those of 1915 either as regards frequency or intensity.

## FOG FORECASTING IN THE UNITED STATES.

By H. C. FRANKENFIELD.

[Author's abstract.]

*Fog, definition of.*—A surface cloud caused (1) by the mixing of two bodies of air of unequal temperature, one or both of which has a high vapor content, and (2) by the cooling of a body of moist, free air to a temperature lower than its dew point.

*Scope of paper.*—To consider the character, extent, etc., of the physical causes of fog, with a view to forecasting the approach of dense fog on the great navigable waters within or immediately adjacent to the United States, viz, coasts of the Great Lakes, the Atlantic, and the Gulf of Mexico.

<sup>1</sup> The full text of this paper will appear in the manual on forecasting, in preparation by the U. S. Weather Bureau.—C. A., Jr.